KERR'S CROSSING BRIDGE
(Bridge No. 6027)
Spanning Christian's Creek at Virginia Route 907
Staunton Vicinity
Augusta County
Virginia

HAER No. VA-101

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
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(BRIDGE NO. 6027)

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LOCATION: Virginia State Route 907 over Christian's Creek, Staunton vicinity, Augusta County, Virginia. USGS Fort Defiance, VA Quadrangle, Universal Transverse Mercator Coordinates: 17.680780.4228940

DATE OF CONSTRUCTION: 1899

BUILDER: Brackett Bridge Company, Cincinnati, Ohio

PRESENT OWNER: Virginia Department of Transportation

SIGNIFICANCE: The Kerr's Crossing Bridge is a representative example of a pin-connected steel Pratt pony truss, typical of late nineteenth century factory-manufactured bridges.

PROJECT INFORMATION: The Kerr's Crossing Bridge was recorded in 1993-1994 by the Cultural Resource Group of Louis Berger & Associates, Inc., Richmond, Virginia, for the Virginia Department of Transportation (VDOT). The recordation was undertaken pursuant to provisions of a Programmatic Memorandum of Agreement (Draft) among the Federal Highway Administration, VDOT, the Virginia SHPO, and the Advisory Council on Historic Preservation concerning management of historic metal truss bridges in Virginia. Project personnel included Richard M. Casella, Architectural Historian; Alison Helms, Historian; and Rob Tucher, Photographer.

DESCRIPTION

The Kerr's Crossing Bridge (VDOT Bridge No. 6027) is a single-span, pin-connected steel pony truss bridge which carries Virginia State Route 907 in an east-west direction over Christian's Creek, 0.5 miles east of the junction of Route 907 and Route 906, in Augusta County, Virginia (Figure 1). Overall, the bridge is 79' long.

The creek is approximately 40' wide at the bridge, which spans it at a height of 20'. The immediate area around the bridge is mixed woodland and open rolling farmland, with farm complexes and residences located within several hundred yards of each end of the bridge.

The truss is a Pratt type, with parallel chords, posts in compression and diagonals in tension. All members of the bridge are steel, joined with pinned, riveted, or threaded connections. The truss is 8' high, 16' wide, and 78' 11-1/2" long overall, with five panels 15' 9-1/2" wide (Figure 2).

Top chords and inclined end posts are riveted box sections, 12" x 7-1/2" overall, built with 12" x 1/4" top plates, 7" x 2" side channels with flanges turned out, and 12" x 3-1/2" x 3/16" bottom stay plates spaced approximately 3' on center. The channels are stamped "Jones & Laughlins." The west end of the truss rides on two plate and roller type bearings; the east end is resting on fixed bed-plate bearings. Both bearing types are 12" x 20" overall. Bottom chords consist of two loop-welded eye-bars of two sizes. The bottom chords of panels one and two in from each end are 3/4" x 2-1/2". The center panel bottom chords are 3/4" x 3-1/2".

The riveted I-section bar-lattice posts are 12" x 4-1/4" overall, made up of T-section flanges connected by 16" x 1-1/4" x 1/4" double bar-lattice. The flanges consist of 2" x 1-1/2" angles with the long leg turned out.

Main diagonals are paired loop-welded eye-bars, 2-1/2" x 1/2", connecting the first and second post. Two opposing counter diagonals cross-brace the center panel, and consist of 7/8" rod and 1-1/4" turnbuckles. The compound hip-verticals consist of both a post, identical to those described, and an elongated U-bolt, of 7/8" diameter, with 1-1/4" threaded ends, beam plates and hex-nuts suspending the first floorbeam. All pins are 2-3/8" diameter.

The floor beams are 12" x 5" rolled I-beams, stamped "Cambria," suspended from the bottom chord pins at each post by 7/8" diameter beam hangers and beam hanger plates. A total of eight floor stringers, spaced approximately 24" on center, rest on the beams. The two outside stringers are 8" x 2" channels, while the remaining six interior stringers are rolled I-beams, 8" x 4", also stamped "Cambria." Bottom lateral bracing rods are 7/8", with one end threaded and one end with a loop-welded eye. The laterals connect to the floor beam with angle brackets which accept both the eye and the threaded ends.

The bridge decking consists of 4" x 10" pressure-treated wood planks, coated with asphalt and attached to the stringers with carriage bolts and deck clips. The roadway is 13' wide and edged with 4" x 6" wood curbing raised 4" off the decking with wood blocks spaced approximately 4' on center. The bridge railings are of double lattice-bar construction, 12" x 2" overall, attached to the posts with short sections of angle. The top of the railing is 36" off the deck.

The bridge rests on beveled-wing abutments of random ashlar limestone approximately 17' wide across the faces. The east abutment is approximately 15' high and the west abutment is approximately 13' high.

HISTORICAL INFORMATION

Background

James Kerr emigrated to Virginia from Pennsylvania in the 1730s and settled on a tract of land at the confluence of Christian's Creek, Long Meadow Run, and the Middle River. Kerr initially built a house and mill on the bottomlands of the valley, near the junction of the three streams, but subsequently found that this location was too easily flooded. In about 1732, he built a log dwelling on higher ground, on the south bank of the Middle River, approximately 500' from the bridge site (Clem 1972:53; VDHR file 7-139).

The junction of the three streams south of the house came to be known as Kerr's Point, and the northeastern corner of the Beverly Patent was established there by survey in 1736 (Clem 1972:55-56; Nutt 1992). Several mills and milldams, including Kerr's Mill, Drumheller Mill, and Brew's Mill, were established on all three waterways converging at Kerr's Point during the eighteenth, nineteenth, and twentieth centuries (Nutt 1992; VDHR file 7-143). The area was physically a risky place to build, and many mills and bridges were destroyed or damaged during the floods of 1847, 1870, 1877, 1886, 1889, 1901, 1913, 1924, and 1928 (Hamrick 1982:6-7; Percy 1967). No structures stood in the floodplain near the confluence of Christian's Creek and Middle River in 1865, but by 1885, H. Brew and Fred Fry had ventured to establish farms in the area (Hotchkiss 1865, 1885:76).

H. Brew built a mill on Christian's Creek near the bridge site between 1885 and 1892. Prior to 1892, Brew's mill was taken over by V.B. Kerr, who also acquired the James Kerr house and property in 1895 (Augusta County Court Order Book 71:576; Hotchkiss 1885:76; VDHR file 7-139). The mill and its associated milldam appear to have been standing about 500' west of the bridge in 1984 (USGS 1984).

History of Kerr's Crossing Bridge

Kerr's Crossing Bridge was completed in the spring of 1899, providing a safe public route over Christian's Creek on the New Hope-Laurel Hill Road (presently known as State Routes 907 and 612). A road crossed Christian's Creek in the vicinity of the bridge prior to 1865, but it is not clear whether this road traversed the creek via a bridge or a ford before the present bridge was built (Hotchkiss 1865, 1885:76).

V.B. Kerr and others filed a petition to establish a bridge over Christian's Creek near Kerr's Mill in the Middle River District on May 3, 1892. V.B. Kerr, owner of the land on the northwest side of the proposed bridge, and Fred Frey, owner of the property on the southeast side, were directed to appear before the court on January 23, 1893 (Augusta County Court Order Book 71:267, 413; Hotchkiss 1885:76).

On April 28, 1893, the court officially delayed making a decision on the bridge, because the county's then-available finances were already slated for other improvements. Later that fall, after hearing testimony from witnesses and after the report of the Middle River District Road Board was filed, the court issued an opinion concurring that the bridge was of public necessity for the accommodation of agriculture and other interests. On October 2, 1893, the court approved construction of the bridge, stipulating that the costs not exceed the Road Board's estimate of $1,902.50. The county agreed to contribute $1,742.00 toward the construction cost, and the balance was to be made up with the $160 generated by a subscription list (Augusta County Court Order Book 71:567).

The court ordered the bridge construction on October 27, 1893, but the county was not able to provide funding from the county levy until 1898 (Augusta County Court Order Book 72:398). This five-year delay was brought about by the depression of 1893, which resulted in the bankruptcies of many industrial enterprises and land speculation companies throughout the Shenandoah Valley, and may have been prolonged by the flood of September 29, 1896. The 1896 flood washed out an existing bridge over Christian's Creek on the New Hope-Staunton Road and created an estimated $500,000 in property damage in Staunton (Augusta County Court Order Book 71:576; Hensley 1979:14; *Staunton Spectator* 1896; Upper Valley Regional Park Authority n.d.:8).

The superstructure of Kerr's Crossing Bridge was fabricated by the Brackett Bridge Company of Cincinnati, Ohio, in 1898. The Middle River District Road Board, made up of members John G. Fulton, J.W. Byers, and Jacob Coffman, coordinated the project, while Engineer D.C. Flory supervised construction and load-tested the completed structure. The final cost of the bridge was $2,038.40, as recorded in the final report of the Road Board filed on June 22, 1899. The Augusta County Court received the bridge as a public highway on June 27, 1899 (Augusta County Court Order Book 72:398; bridge plate).

Thomas Pratt and the Pratt Truss

Thomas Pratt was born in Boston in 1812, the son of noted Boston architect Caleb Pratt. Thomas was thoroughly educated by his father in the sciences, entered Rensselaer Polytechnic Institute at age 14, became an engineer with the United States Army Engineers at 18, and began a professional engineering career with Boston & Maine Railroad at age 21. At the beginning of his career, which lasted until his death in 1875, Pratt was probably the best educated bridge engineer in America. Pratt worked his entire life in the employ of various New England railroad companies, including the Providence & Worcester, the Hartford & New Haven, and the New York & Boston (American Society of Civil Engineers [ASCE] 1876:332-333; Condit 1960:108).

Pratt is best remembered for a bridge truss that he designed in 1842 that consisted of two parallel chords connected by vertical wood posts in compression and double wrought iron diagonals in tension. The design, while similar in appearance to the truss recently patented by William Howe, functioned structurally opposite to the Howe truss, Howe having put the verticals in tension and the diagonals in compression. Modern engineers consider the Pratt design to be the first scientifically designed truss (Condit 1960:109). Pratt had recognized and applied a basic principle of structural engineering to truss design: reducing the length of the member in compression reduces the bending movement, allowing members of smaller cross section to be used without sacrificing overall strength. The basic design premise of a truss is to provide equal strength with less weight and material than a solid beam, and Pratt's innovation applied that principle to the design of the components of the truss itself.

In 1844, Pratt and his father were granted a patent for two truss designs, one with parallel chords and one with a polygonal top cord. Either design could be built of a combination of wood and iron, or of iron alone. The polygonal version again reflected Pratt's understanding of the application of mathematical principles in calculating the forces involved and the precise strength of material required to counter those forces. Pratt's patent was renewed in 1858. The use of the Pratt truss for the deck of John Roebling's Niagara River Suspension Bridge in 1855 drew worldwide attention to the design and undoubtedly contributed to its increased usage. One of Pratt's best works was the Eastern Railroad's Merrimac River Bridge at Newburyport, Massachusetts. The Merrimac bridge, completed in 1865, consisted of seven wooden Pratt trusses and a center draw span of iron (ASCE 1876:334-335; Cooper 1889:11; Johnson 1929:179).

In its wooden form, the Pratt truss never attained the popularity of the Howe design, but by 1889 in its iron form it ranked first in usage (Cooper 1889:11). The first all-iron Pratt truss bridges were built by J.H. Linville for the Pennsylvania Railroad in 1850. Application of the Pratt truss in its original form reached a high point with the construction of the Erie Railroad Bridge at Portage, New York, in 1875, and the Cincinnati Southern Railroad Bridge at

Cincinnati in 1876, both early landmarks in railroad bridge engineering. Literally thousands of bridges, both highway and railroad, have been built following the Pratt design or some variation (Condit 1960:111, 112, 302).

The Brackett Bridge Company

The Brackett Bridge Company began in Cincinnati, Ohio, as the Lomas Blacksmith Shop, established in the mid-1870s by William Lomas. In 1878, the Cincinnati City Directory listed the business as "Wm. Lomas & Co., 21 West Second Street," engaged in the manufacture of tools and vices. The name changed to Lomas Forge and Bridge Company in 1880 as the company redirected its manufacturing efforts to bridges (Miars 1972:21). In 1890, F.J.P. Brackett, the shop superintendent, bought controlling interest of the company and changed the name to the Brackett Bridge Company. The company closed its doors sometime in the mid 1920s (Darnell 1984:48).

According to *A Survey and Photographic Inventory of Metal Truss Bridges in Virginia, 1865-1932*, a study conducted by the VDOT Research Council in 1973, the Brackett Bridge Company built a total of ten truss bridges in Virginia: seven in the Staunton VDOT Construction District, two in the Culpeper District, and one in the Lynchburg District (Deibler 1973). Two other Brackett Company bridges, Mansion Truss Bridge located in Campbell County (Virginia Bridge No. 6904), and Carpenter's Ford Bridge located in Augusta County (Virginia Bridge No. 6147), are included in the seventeen historic metal truss bridges recorded by VDOT in 1993-1994, of which this report is a part.

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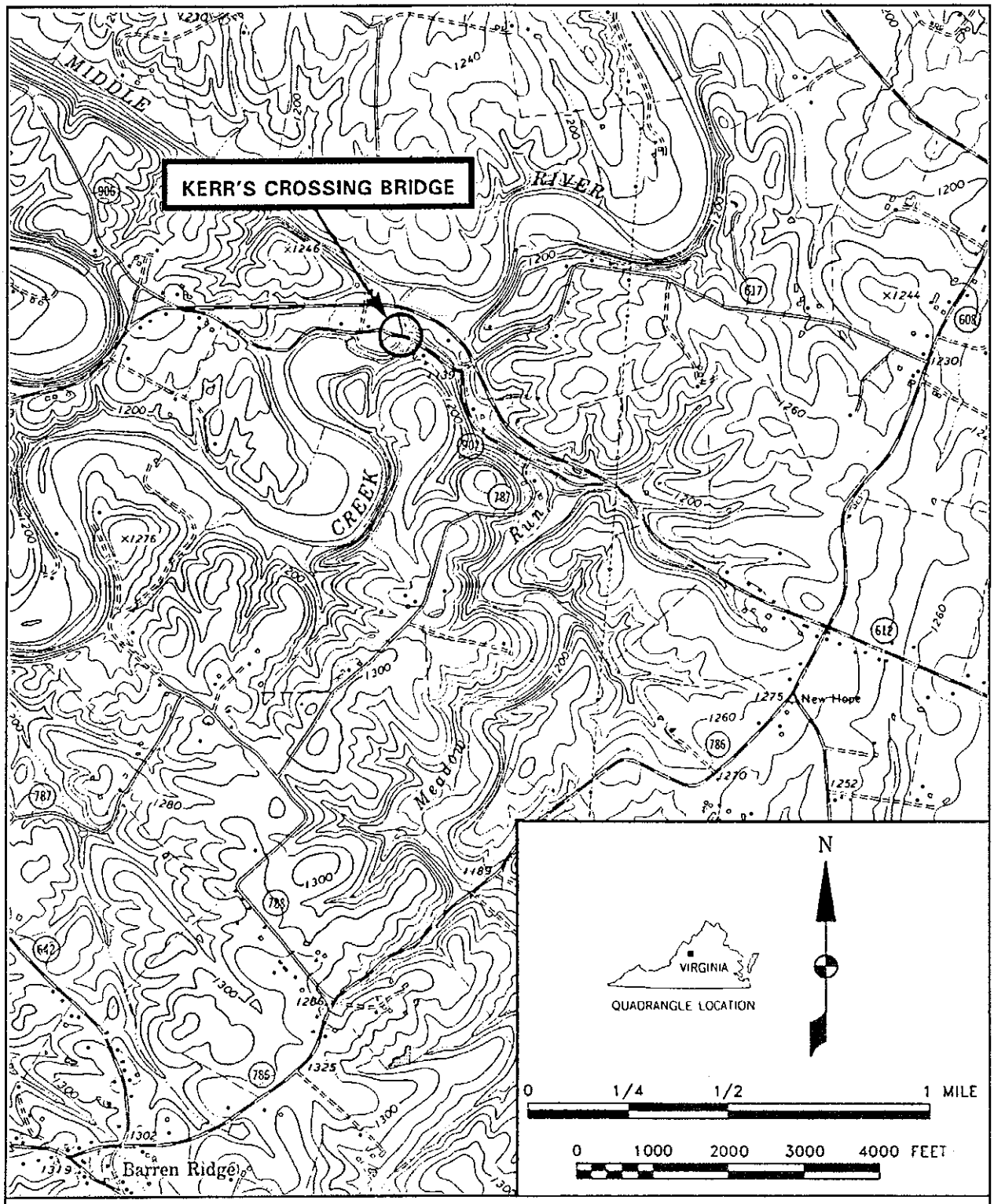

FIGURE 1: Location Map

SOURCE: USGS Fort Defiance, VA, 7.5 Minute Quadrangle, 1964 (Photorevised 1978, Photoinspected 1984)

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TRANSVERSE SECTION

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SOURCE: Virginia Department of Transportation 1974

FIGURE 2: Original Bridge Report, Bridge No. 6027, November 14, 1974